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Claims

1. A method for controlling a tablet press, whereby powder or granular material is compressed in dies arranged circumferentially in a rotary die table by means of reciprocating punches, said method comprising the steps:

consecutively supplying a quantity of material to be compressed into each die,

subjecting the quantity of material located in each die to a pre-compression and subsequently a main-compression,

measuring, during the pre-compression of the quantity of material located in each die, a value of a first parameter representative of the weight of the quantity of material fed into the die,

measuring, during the main-compression of the quantity of material located in each die, a value of a second parameter representative of the hardness of the tablet resulting from the compression,

regulating the quantity of material supplied to each die on the basis of a deviation between a previously measured value of the first parameter and a first set value, and

regulating the degree of compression that the quantity of material located in each die is subjected to during main-compression on the basis of a deviation between a previously measured value of the second parameter and a second set value.

2. A method according to claim 1, wherein said compression degree regulation is performed substantially independently of said powder quantity regulation.

3. A method according to claim 1, wherein said compression degree regulation and said powder quantity regulation are interrelated.

4. A method according to claim 1, wherein said compression degree regulation in addition is performed on the basis of a measured value of the first parameter.

5. A method according to claim 1, wherein said powder quantity regulation is based on a mean value of several single measured values of the first parameter, and said compression degree regulation is based on a mean value of several single measured values of the second parameter.

6. A method according to claim 5, wherein the quantity of powder fed consecutively into each die is maintained constant as long as said mean value of the first parameter falls within preset first correction tolerance limits, and wherein the degree of compression during main-compression of consecutive tablets is maintained constant as long as said mean value of the second parameter falls within preset second correction tolerance limits.

7. A method according to claim 1, wherein the first parameter corresponds substantially to a thickness of a tablet during pre-compression of said tablet under substantially constant compression force.

8. A method according to claim 1, wherein the first parameter corresponds substantially to the maximum compression force exerted by a punch on a tablet during pre-compression of said tablet to a predetermined tablet thickness.

9. A method according to claim 1, wherein the degree of compression during main-compression is regulated by adjusting the final thickness to which the tablet is compressed.

10. A method according to claim 1, wherein the second parameter corresponds substantially to the maximum compression force exerted on a tablet during

main-compression of said tablet to a predetermined tablet thickness.

11. A method according to claim 1, wherein the second parameter corresponds substantially to the time interval during which a tablet is compressed during main-compression of said tablet.

12. A method according to claim 1, wherein said powder quantity regulation is re-calibrated periodically after ascertaining the weight of a number of tablets ejected from the die table, determining the mean tablet weight of said tablets, and comparing said mean tablet weight with a desired tablet weight.

13. A method according to claim 1, wherein said compression degree regulation is re-calibrated periodically after ascertaining the hardness of a number of tablets ejected from the die table, determining the mean tablet hardness of said tablets, and comparing said mean tablet hardness with a desired tablet hardness.

14. A method according to claim 1, wherein compressed tablets having a measured first parameter value falling outside preset first rejection tolerance limits are separated automatically from the remaining tablets for rejection.

15. A method according to claim 1, wherein compressed tablets having a measured second parameter value falling outside preset second rejection tolerance limits are separated automatically from the remaining tablets for rejection.

16. A method according to claim 1, said method comprising the steps:

consecutively supplying a quantity of a first material to each die,

subjecting the quantity of the first material located in each die to a first layer pre-compression

and subsequently a first layer main-compression, during which first layer main-compression the first material is compressed to a preset thickness of a first layer of the tablet,

subsequently to the first layer main-compression, supplying a quantity of a second material to each die,

subjecting the quantity of material located in each die to a second layer pre-compression and subsequently a double layer main-compression,

measuring, during the first layer pre-compression, a value of a first parameter representative of the weight of the quantity of the first material compressed,

regulating the quantity of the first material supplied to each die on the basis of a deviation between a previously measured value of the first parameter for the first material and a first set value for the first material,

measuring, during the second layer pre-compression, a value of a first parameter substantially representative of the weight of the quantity of the second material compressed,

regulating the quantity of the second material supplied to each die on the basis of a deviation between a previously measured value of the first parameter for the second material and a first set value for the second material,

measuring, during the double layer main-compression, a value of a second parameter representative of the hardness of the total tablet resulting from said main-compression,

regulating the degree of compression that the total quantity of the first material and the second material located in each die is subjected to during

the double layer main-compression on the basis of a deviation between a previously measured value of the second parameter for the total double layer tablet and a second set value for the double layer tablet.

17. A rotary tablet press comprising a housing and a rotary die table having a number of dies arranged circumferentially, each die being associated with first and second punches, each punch having first and second ends, said first punch ends being receivable in the die and arranged for compression of a powder or granular material in the die,

the housing comprising a feeding device for the supply of material to be compressed into the dies, a tablet discharge device for removal of compressed material in the form of tablets, and

at least one pre-compression station and at least one main-compression station, each said compression station being provided with first and second compression rollers adapted to interact with the second punch ends, respectively, in order to perform compression of material located in the dies by reciprocation of the punches,

the pre-compression station comprising a weight transducer for measuring a value of a first parameter representative of the weight of a quantity of material fed into a die,

the main-compression station comprising a hardness transducer for measuring a value of a second parameter representative of the hardness of a tablet resulting from a compression in the main-compression station,

a powder quantity regulator being provided for regulation of the quantity of material supplied to each die by the feeding device on the basis of a deviation between a value of the first parameter previ-

ously measured by the weight transducer and a first set value, and

a compression degree regulator being provided for regulation of the degree of compression that the quantity of material located in each die is subjected to in the main-compression station on the basis of a deviation between a value of the second parameter previously measured by the hardness transducer and a second set value.

18. A rotary tablet press according to claim 17, wherein said compression degree regulator is adapted to operate substantially independently of said powder quantity regulator.

19. A rotary tablet press according to claim 17, wherein said compression degree regulator and said powder quantity regulator are interrelated.

20. A rotary tablet press according to claim 17, wherein said compression degree regulator in addition is adapted to regulate on the basis of a measured value of the first parameter.

21. A rotary tablet press according to claim 17, wherein the powder quantity regulator is adapted to regulate the performance of the feeding device on the basis of a mean value of several single measured values of the first parameter, and the compression degree regulator is adapted to regulate the performance of the main-compression station on the basis of a mean value of several single measured values of the second parameter.

22. A rotary tablet press according to claim 21, wherein the powder quantity regulator is adapted to maintain the quantity of powder fed consecutively into each die constant as long as said mean value of the first parameter falls within preset first correction tolerance limits, and wherein the compression

degree regulator is adapted to maintain the degree of compression exerted on consecutive tablets in the main-compression station constant as long as said mean value of the second parameter falls within preset second correction tolerance limits.

23. A rotary tablet press according to claim 17, wherein the first compression roller in the pre-compression station is suspended in a piston arranged displaceably in an air cylinder, said air cylinder being connected to a supply of compressed air and associated with a regulator adapted to maintain a constant air pressure in the air cylinder, and wherein said weight transducer is adapted to measure the displacement of the piston in the air cylinder during compression of a tablet.

24. A rotary tablet press according to claim 17, wherein the first compression roller in the pre-compression station is adapted to be substantially fixedly positioned during compression, and wherein said weight transducer is adapted to measure the force exerted on said first compression roller by the second punch ends at compression.

25. A rotary tablet press according to claim 17, wherein the powder quantity regulator is adapted to regulate the quantity of material to be compressed in each die by adjustment of the position of the second punches at the feeding device.

26. A rotary tablet press according to claim 17, wherein at least one compression roller of the main-compression station is displaceable by means of a linear actuator, and wherein the compression degree regulator is adapted to regulate the degree of compression performed in the main-compression station by adjustment of the position of said at least one compression roller of the main-compression station.

27. A rotary tablet press according to claim 17, wherein the first compression roller in the main-compression station is adapted to be substantially fixedly positioned during compression, and wherein said hardness transducer is adapted to measure the force exerted on said first compression roller by the second punch ends at compression.

28. A rotary tablet press according to claim 17, wherein the tablet discharge device is connected to an automatic testing device adapted to ascertain the weight of a number of tablets ejected from the die table, determine the mean tablet weight of said tablets, and supply said mean tablet weight to the powder quantity regulator.

29. A rotary tablet press according to claim 28, wherein a compression roller of the pre-compression station is displaceable by means of a linear actuator, and wherein a general control system is adapted to adjust the position of said compression roller according to the mean tablet weight supplied by the automatic testing device.

30. A rotary tablet press according to claim 17, wherein the tablet discharge device is connected to an automatic testing device adapted to ascertain the hardness of a number of tablets ejected from the die table, determine the mean tablet hardness of said tablets, and supply said mean tablet hardness to the compression degree regulator.

31. A rotary tablet press according to claim 17, wherein the tablet discharge device is connected to an automatic rejection device adapted to separate tablets having a measured first parameter value falling outside preset first rejection tolerance limits from the remaining tablets.

32. A rotary tablet press according to claim

17, wherein the tablet discharge device is connected to an automatic rejection device adapted to separate tablets having a measured second parameter value falling outside preset second rejection tolerance limits from the remaining tablets.

33. A rotary tablet press according to claim 17, said tablet press comprising

a first layer production section comprising a feeding device for a first material, a first layer pre-compression station and a first layer main-compression station, whereby said main-compression station is adapted for compression of a quantity of the first material to a preset thickness of a first layer of the tablet,

and a second layer production section comprising a feeding device for a second material, a tablet discharge device, a second layer pre-compression station and a second layer main-compression station,

the first layer pre-compression station comprising a weight transducer for measuring a value of a first parameter representative of the weight of a quantity of the first material compressed in the pre-compression station,

a first layer powder quantity regulator being provided for regulation of the quantity of material supplied to each die by the feeding device on the basis of a deviation between a previously measured value of the first parameter for the first material and a first set value for the first material, and

the second layer pre-compression station comprising a weight transducer for measuring a value of a first parameter representative of the weight of a quantity of the second material compressed in the pre-compression station,

a second layer powder quantity regulator being

provided for regulation of the quantity of material supplied to each die by the feeding device on the basis of a deviation between a previously measured value of the first parameter for the second material and a first set value for the second material, and

the double layer main-compression station comprising a hardness transducer for measuring a value of a second parameter representative of the hardness of a total tablet resulting from said main-compression,

a double layer compression degree regulator being provided for regulation of the degree of compression that the total quantity of the first material and the second material located in each die is subjected to during the double layer main-compression on the basis of a deviation between a previously measured value of the second parameter for the total double layer tablet and a second set value for the double layer tablet.